



WORK-RELATED MUSCULOSKELETAL DISORDERS IN THE DENTAL PROFESSION AND ITS PREVENTION- REVIEW.

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ABSTRACT

Aim: This review provide a detailed examination and discussion about the prevalence of musculoskeletal disorders (MSD) in dental staff, possible etiological factors and its prevention.

Material and methods: This systematic review was carried out on Medline by the keywords "dental staff", "ergonomics" and "musculoskeletal disorders". Study design, method of data collection, assessment tools and results obtained in the respective study were noted.

Results: Dental staff has a higher prevalence of profession related musculoskeletal disorders. Risk factors of work-related musculoskeletal disorders in dentistry include -sub-optimal work-environment-ergonomics that might be responsible for improper positioning, prolonged awkward postures and movements, causing unnecessary musculoskeletal loading, discomfort and fatigue.

Conclusion: This review shows that dental professionals are at higher risk for musculoskeletal disorders. Prevention of musculoskeletal disorders is possible by using proper ergonomically designed dental equipment, maintaining proper posture during clinical work and stretching and strengthening exercises.

KEYWORDS : musculoskeletal disorders, dental personnel, ergonomics

Introduction

Occupational health hazards are common in working places, and the prevalence is on the rise. According to the U.S. Occupational Safety and Health Administration, work-related musculoskeletal disorders (MSDs) occur when there is a mismatch between the physical requirements of the job and the physical capacity of the human body.¹ MSDs are significant workplace problems affecting occupational health, productivity and the careers of the working population.²

The World Health Organization defines an MSD as "a disorder of the muscles, tendons, peripheral nerves or vascular system not directly resulting from an acute or instantaneous event (e.g., slides or falls). These disorders are considered to be work-linked when the work environment and the performance of work contribute significantly, but are just one of a number of genes leading to the movement of a multifactorial disease"³

The reasons for MSDs are direct injuries, Insufficient or inappropriate equipment, inappropriate work area design, or sitting for extended times with a flexed and twisted back, repetitive movements of working with dental instruments, are contributing factors to neck and low back ailments.⁴

Significant difficulties in diagnosis generate an ongoing argument on many facets of these conditions. Nevertheless, several risk factors have been identified and preventive measures are immediately usable. To reach a realistic target of safety and health at work, prevention is clearly the best approach; therefore, preventive philosophy deserves considerable attention.⁵

Thus, this review paper aims primarily to furnish background information on MSDs in dentistry and on the identified risk factors,

but also to talk about the basic philosophy of prevention.

Methods

A systemic review of the printed literature was conducted to recover out the risk factors among the dentists and recommendations regarding prevention of MSD. The literature search was used MEDLINE by the advanced search and articles were found using the keywords "dental staff", "ergonomics" 'occupational health', 'occupational disease and "musculoskeletal disorders".

Results

The reviews of articles showed that dentists are prone to work related MSDs because most of time during dental procedures they assume static postures, which require more than half of the muscles of the body to contract so as to hold the body motionless while resisting gravity. When the human body is subjected repeatedly too prolonged static postures, it results in a series of events that may result in injury pain, or a career-ending MSD. Ischemia, trigger points, muscle imbalances, spinal disk degeneration and joint hypomobility are some of the physiological consequences of prolonged Static Postures (PSPs).

Discussion

Dentists must understand the mechanisms that contribute to MSDs so they can make informed choices regarding ergonomic equipment, exercise and lifestyle. Possessing this knowledge is key in preventing and managing work-related musculoskeletal problems in clinical dental medicine.

According to Rundcrantz BL (1991) musculoskeletal disorders among dental practitioners can be classified as presented in Table 1.⁶

S.No.	Type of musculoskeletal disorders	Symptoms
1	Neck and Shoulder disorders a) Myofascial Pain Disorder b) Cervical spondylosis c) Thoracic outlet syndrome	Pain and tenderness in the neck, shoulder and arm muscle. Painful trigger points upon touch. Intermittent/ chronic neck and shoulder pain or stiffness, headache, hand and arm pain, numbness, tingling and clumsiness. Pain in shoulder, arm or hand, numbness, tingling of fingers, muscle weakness/ fatigue, cold arm or hand.

	d) Rotator cuff tendonitis/tears	Pain and stiffness in shoulders associated with backward and upward arm movements. Weakness of rotator cuff muscle.
2	Hand and wrist disorders a) DeQuervain's Disease b) Carpal Tunnel Syndrome c) Guyon's Syndrome	Pain in the thumb and wrist area when grasping, pinching, twisting. Hand or finger numbness, pain, tingling, burning, clumpiness. Eventual muscle weakness and atrophy. Symptoms often worse with increased activity. Symptoms begin with a feeling of pins and needles in the ring and index fingers.
3	Back Disorders A) Herniated spinal disk b) Lower Back Pain c) Sciatica	Back and leg numbness, tingling, pain, weakness. Worsens with coughing, sneezing, sitting, driving, bending forward. Pain, Stiffness in lower spine and surrounding tissues Pain from the lower back or hip radiating to the buttocks and legs. Leg weakness, numbness or tingling. Possible causes are prolapsed intervertebral disc pressuring the sciatic nerve, worsened with prolonged sitting or excessive bending/ lifting

Measures to reduce musculoskeletal disorder

Musculoskeletal problems can be managed or alleviated effectively using a multifaceted approach that includes–

1. Postural Awareness Techniques
2. Positioning Strategies
3. Periodic Breaks and Stretching
4. Strengthening Exercises

Postural awareness techniques- Maintain the lower back curve: Research shows that maintaining the low back curve—the lumbar lordosis—when sitting can reduce or prevent low back pain^{7,8}

Methods to maintain lower back curve as follows-

1. Tilt the seat angle slightly forward five to 15 degrees to increase the low back curve.
2. Sit close to the patient and position, knees under the patient's chair if possible. This can be facilitated by tilting the seat and using patient chairs that have thin upper backs and headrests.
3. Consider using a saddle-style operator stool that promotes the natural low back curve by increasing the hip angle to approximately 130 degrees.
4. Adjust the chair so your hips are slightly higher than your knees and distribute your weight evenly by placing your feet firmly on the floor.
5. Use the lumbar support of the chair as much as possible by adjusting the lumbar support forward to contact you back.
6. Stabilize the low back curve by contracting the transverse abdominal muscles.
7. Pivot forward from your hips, not your waist.⁹

Adjust operator chair properly: According to Chaffin and colleagues,¹⁰ the era when sitting work posture problems were solved by simply providing a chair is over. Operators need to know how to adjust the features of their chairs to obtain maximal ergonomic benefits.

1. Adjust your chair first.
2. Position the buttocks snugly against the back of the chair. The edge of the seat should not contact the backs of the knees.
3. Place feet flat on the floor and adjust the seat height up to thighs gently slope downward while the feet remain flat on the floor.
4. Move backrest up or down until the lumbar support nestles in the natural lumbar curve of the low back. Then angle the lumbar support forward to facilitate contact with the low back.
5. Tilt the seat forward about five to 15 degrees. If you are beginning to work with the seat tilt function, start with a slight tilt and later increase the degree of tilt as is comfortable.
6. Adjust the armrests, which are designed to decrease neck and shoulder fatigue and strain, to support elbows in the neutral shoulder position.

Positioning strategies

According to Lehto and colleagues,¹¹ the concept of a single correct work posture may be physiologically invalid, as the human body may be made for movement and ever-changing postures.

Some dental schools and educational programs stress the importance of using one “home” position while working. While it is

important to use ergonomically correct positions and postures, some studies suggest that several home positions may be better than one.^{12,13}

Following strategies can be used to avoid stress on muscles. Alternate between standing and sitting. Reposition the feet.

Avoid twisting: Operators should try to retrieve items with the closest hand, especially with rear delivery systems, to avoid twisting or reaching across the body.

Position patients at the proper height.⁹

Stretching

Dentists tend to lose flexibility in the direction opposite to that in which they are postured statically during the day.¹⁴ Directional stretches can be performed in or out of the operator and can be incorporated into a daily routine that facilitates balanced musculoskeletal health. Directional stretching involves a rotation, side bending or extension component that generally is in the opposite direction of that in which the operator frequently works.¹⁵ Stretching increases blood flow to muscles; increases production of joint synovial fluid; reduces formation of trigger points; maintains normal joint range of motion; increases nutrient supply to vertebral disks, creates a relaxation response in the central nervous system; warms up the muscle before beginning to work; identifies tight structures that may be predisposed to injury.⁹

Strengthening exercises-

Dental practitioners should perform specific strengthening exercises for the torso and shoulder girdle to enhance the health and integrity of the spinal column, maintain good working posture, optimize the use of the arms and hands and prevent wounds.

Aerobic exercise should be performed three to four times a week for at least 20 minutes. One major contributing factor to MSDs is decreased flow of nutrients and oxygen to muscles.¹⁵ Aerobic exercise increases blood flow to all of the tissues in the body and improves their ability to use oxygen. Aerobic exercise improves cardiovascular and cardiorespiratory function, lowers heart rate and blood pressure, increases high-density lipoprotein (good) cholesterol, decreases blood triglycerides, reduces body fat, improves stress tolerance, increases mental acuity, improves sleep quality and may increase longevity.^{16,17}

Conclusion

Dental professionals are at higher risk for musculoskeletal disorders. Both prevention and treatment of MSD are possible by using a multifaceted approach that includes proper positioning techniques, periodic break and stretching and strengthening exercises.

References

1. Occupational Safety and Health Administration. U.S. Department of Labor. Preventing work-related musculoskeletal disorders. 1999. Retrieved July 4, 2013,
2. Nermin Y. Musculoskeletal disorders (Msd s) and dental practice. Part 1. General Information—terminology, etiology, work-relatedness, magnitude of the problem, and prevention. *Int Dent.J.* 2006; 56(6):359–66.
3. Identification and control of work-related diseases: report of a WHO expert

- committee. World Health Organ Tech Rep Ser. 1985;174:7-11.
4. Kierklo A, Kobus A, Jaworska M, Botuli A, ski B. Work-related musculoskeletal disorders among dentists - a questionnaire survey. *Ann Agric Environ Med.* 2011; 18:79-84.
 5. Rucker LM. Technology meets ergonomics at the dental clinic: new toys for old games? *J Am Coll Dent.* 2000;67(2):26-9.
 6. Chaffin D, Andersson G, Martin B. *Occupational biomechanics.* 3rd ed. New York: Wiley-Interscience; 1999:364, 366, 386.
 7. Hedman T, Fernie G. Mechanical response of the lumbar spine to seated postural loads. *Spine* 1997;22:734-43.
 8. Harrison D, Harrison S, Croft A, et al. Sitting biomechanics, part 1: review of the literature. *J Manipulative Physiol Ther* 1999;22(9):594-609.
 9. Bethany Valachi, Keith Valachi. Preventing musculoskeletal disorders in clinical dentistry. *JADA*, Vol. 134, December 2003.
 10. Chaffin, D, Andersson G, Martin B. *Occupational biomechanics.* 3rd Ed. New York: Wiley-Interscience; 1999:364, 366, 386.
 11. Lehto T, Helenius H, Alaranta H. Musculoskeletal symptoms of dentists assessed by a multidisciplinary approach. *Community Dent Oral Epidemiol* 1991;19:38-44.
 12. Finsen L, Christensen H, Bakke M. Musculoskeletal disorders among dentists and variation in dental work. *Appl Ergon* 1997;29(2):119-25.
 13. Callaghan J, McGill S. Low back joint loading and kinematics during standing and unsupported sitting. *Ergonomics* 2001;44:280-94.
 14. Rundcrantz B, Johnsson B, Moritz U. Occupational cervicobrachial disorders among dentists: analysis of ergonomics and locomotor functions. *Swed Dent J* 1991;15:105-15.
 15. Valachi K, Valachi B. Mechanisms leading to musculoskeletal disorders in dentistry. *JADA* 2003;10:1344-50.
 16. McArdle W, Katch F, Katch V. *Exercise physiology: Energy, nutrition and human performance.* 3rd ed. Philadelphia: Lea & Febiger; 1991:698-735.
 17. Shikha Baghi, Bhandari, Rajat Bhandari, Ranjit Singh Uppal, Deepak Grover. Musculoskeletal disorders in clinical dentistry and their prevention. *Journal of Orofacial Research*, April-June 2013; 3(2):106-14.